National Transportation Safety Board

Beyond ‘Trust but Verify’: What is Next for Pipeline Safety?

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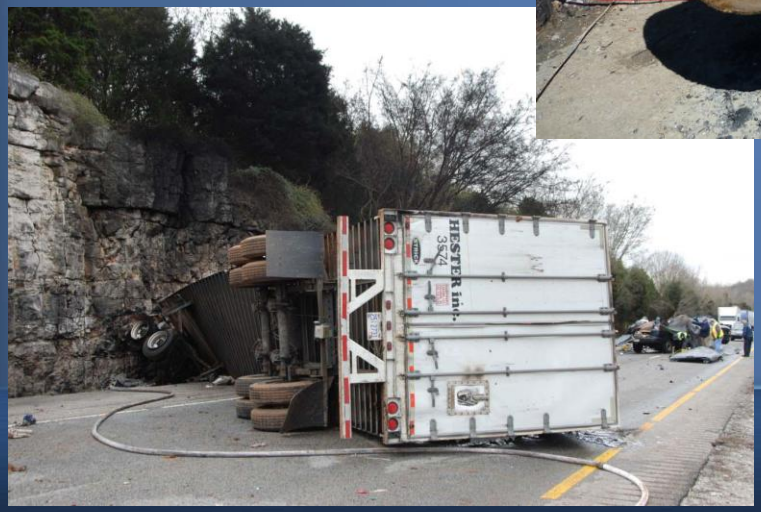
Board Member

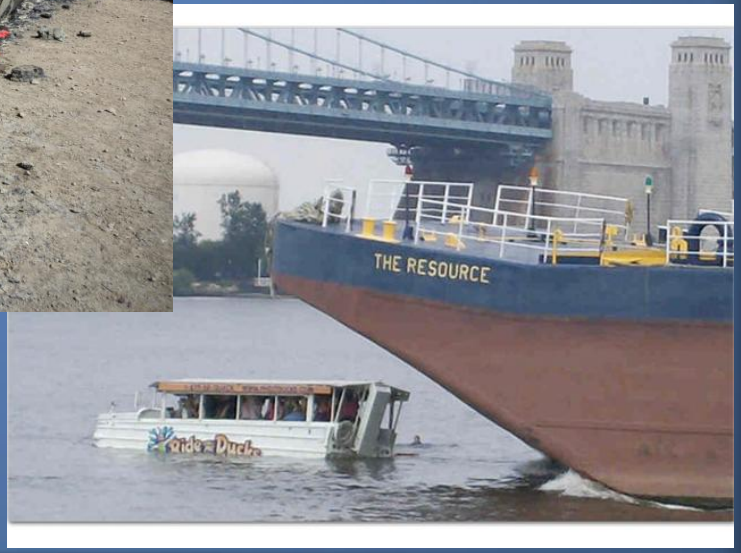
Pipeline Safety Trust Conference
November 8, 2012

1) determining the probable cause of transportation accidents

2) making recommendations to prevent their recurrence

All Modes





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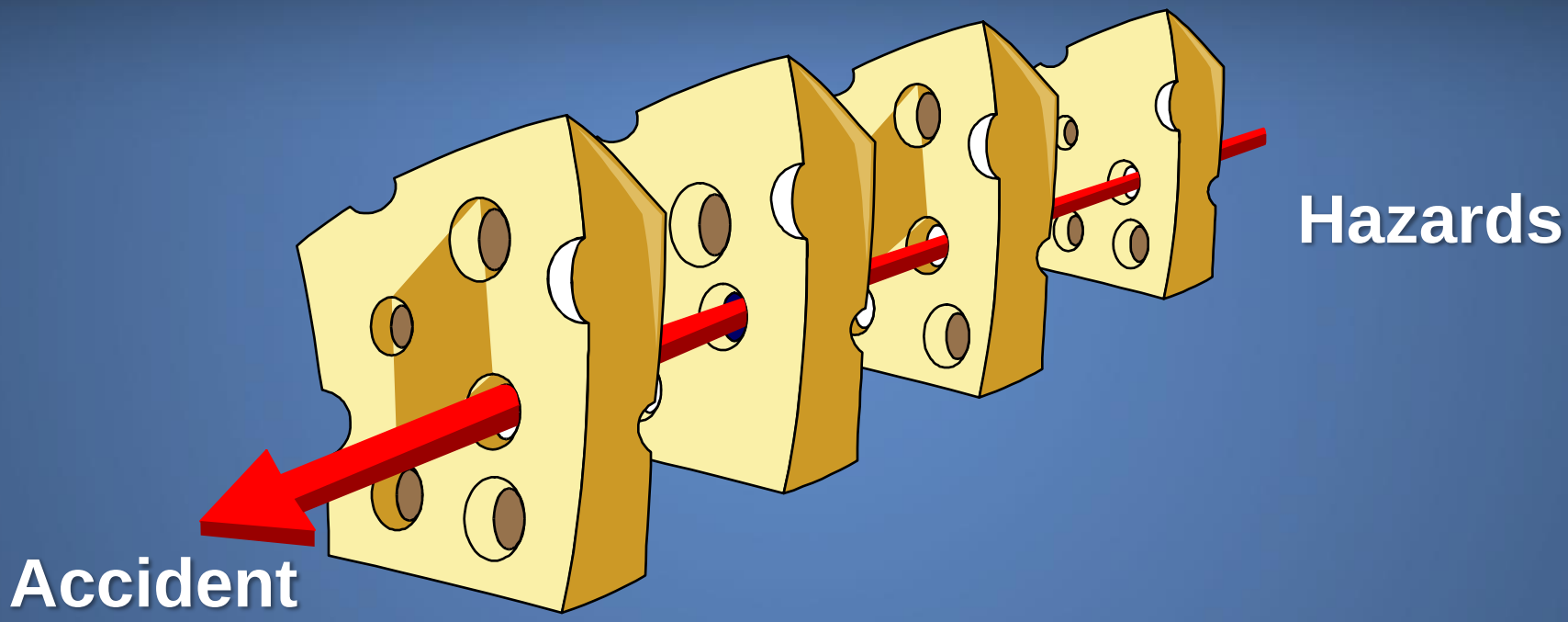
“Swiss Cheese” Model (Reason)



Successive layers of defenses, barriers, and safeguards

NTSB Characterized as:

‘moral compass and industry conscience’

NTSB Chairman Deborah A.P. Hersman

Pacific Gas and Electric Company
Natural Gas Transmission Pipeline Rupture and Fire
San Bruno, California
September 9, 2010

Accident Report

NTSB/PAR-11/01
PB2011-916501

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PG&E/San Bruno Gas Pipeline Explosion

- 8 fatalities
- 10 serious injuries
- 48 minor injuries

- 108 homes affected
  - 38 destroyed
  - 17 sev - mod damage
  - 53 minor damage

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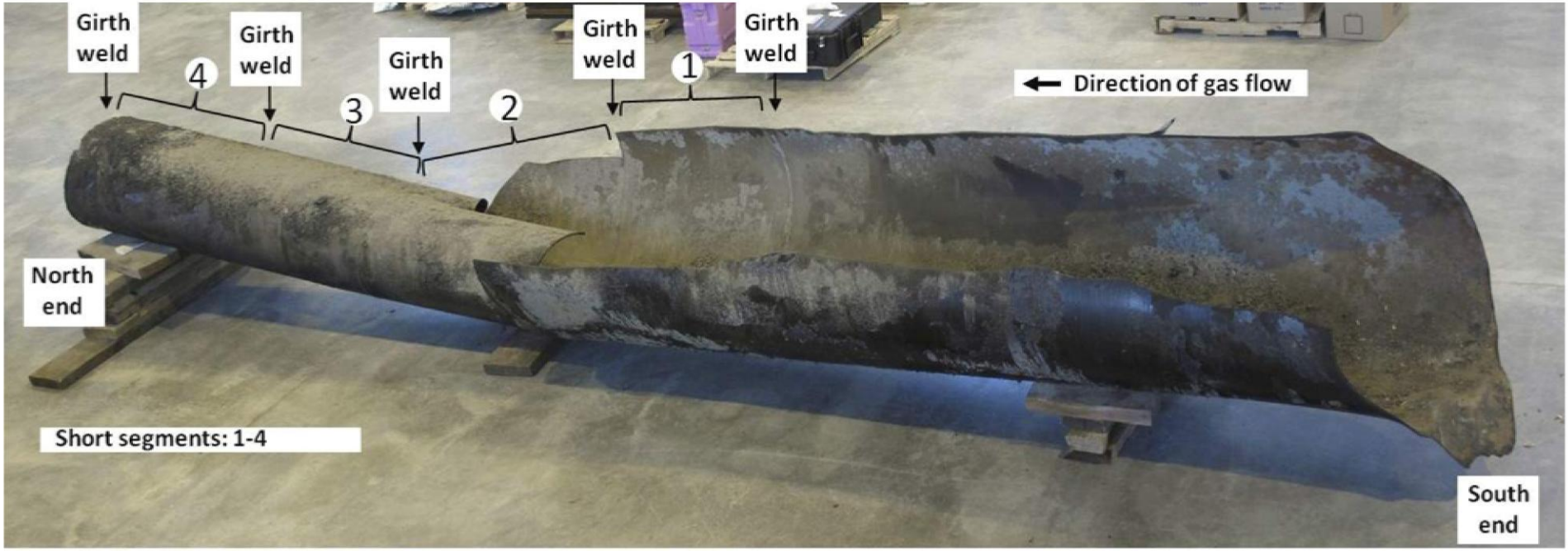
Probable Cause: PG&E

(1) inadequate quality assurance and quality control in 1956 relocation project

(2) inadequate pipeline integrity management program, which failed to detect and repair or remove the defective pipe section

Ruptured Pipe



Photograph of the 28-foot-long ruptured section of pipeline

Contributing Factors

- CPUC and DOT exemptions of existing pipelines from regulatory requirement for pressure testing
  - likely would have detected the installation defects
- CPUC's failure to detect the inadequacies of PG&E's pipeline integrity management program

Contributing to Accident Severity

- lack of either automatic shutoff valves or remote control valves on the line and PG&E's flawed emergency response procedures and delay in isolating the rupture to stop the flow of gas

— 95 minutes to shutoff gas flow —

San Bruno, CA

Safety Recommendations: 39

- PHMSA (16)
- PG&E (12)
- CPUC (5)
- U.S. Secretary of Transportation (4)
- INGAA and AGA (1)
- Governor of California (1)

Enbridge Incorporated
Hazardous Liquid Pipeline Rupture and Release
Marshall, Michigan
July 25, 2010

Accident Report

NTSB/PAR-12/01
PB2012-916501

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Enbridge Rupture and Release Marshall, Michigan (July 25, 2010)

NTSB

Probable Cause

- corrosion fatigue cracks that grew and coalesced from crack and corrosion . . . producing a substantial crude oil release that went undetected by the control center for over 17 hours. The rupture and prolonged release were made possible by pervasive organizational failures at Enbridge Incorporated (Enbridge) that included the following:
    - deficient integrity management procedures
    - inadequate training of control center personnel
    - insufficient public awareness and education

Enbridge Rupture and Release Marshall, Michigan (July 25, 2010)

Contributing Factors

- Pipeline and Hazardous Materials Safety Administration's (PHMSA) weak regulation for assessing and repairing crack indications, as well as PHMSA's ineffective oversight of pipeline integrity management programs, control center procedures, and public awareness.

Contributing to Accident Severity

(1) Enbridge's failure to identify and ensure the availability of well-trained emergency responders with sufficient response resources

(2) PHMSA's lack of regulatory guidance for pipeline facility response planning

(3) PHMSA's limited oversight of pipeline emergency preparedness that led to the approval of a deficient facility response plan

Safety Recommendations: 19

- U.S. Secretary of Transportation (2)
- PHMSA (8)
- Enbridge Incorporated (6)
- American Petroleum Institute (1)
- Pipeline Research Council International (1)
- International Association of Fire Chiefs & National Emergency Number Association (1)

Managing Safety: There is No Magic Bullet

#1: Meaningful Metrics

- Define objectives/outcomes
- Data-driven actions
- Performance-based standards
  (vs. risk-based)
- Non-punitive reporting systems

Testing and Inspection

DuBois pipe failure

DuBois

DuBois house destruction

DuBois, PA

#2: Share - Do Not Compete on Safety

- Share:
  - data
  - best practices
  - problems/solutions
- Transparency
- Develop/test industry models

Timely Response: ASV/RCSV

#3: Trust and Verify

- Focus/enhance safety culture
- Oversight: independent audits/reviews (internal and external)
- Entire industry shared responsibility: companies, federal, state, public ('all for one, one for all')

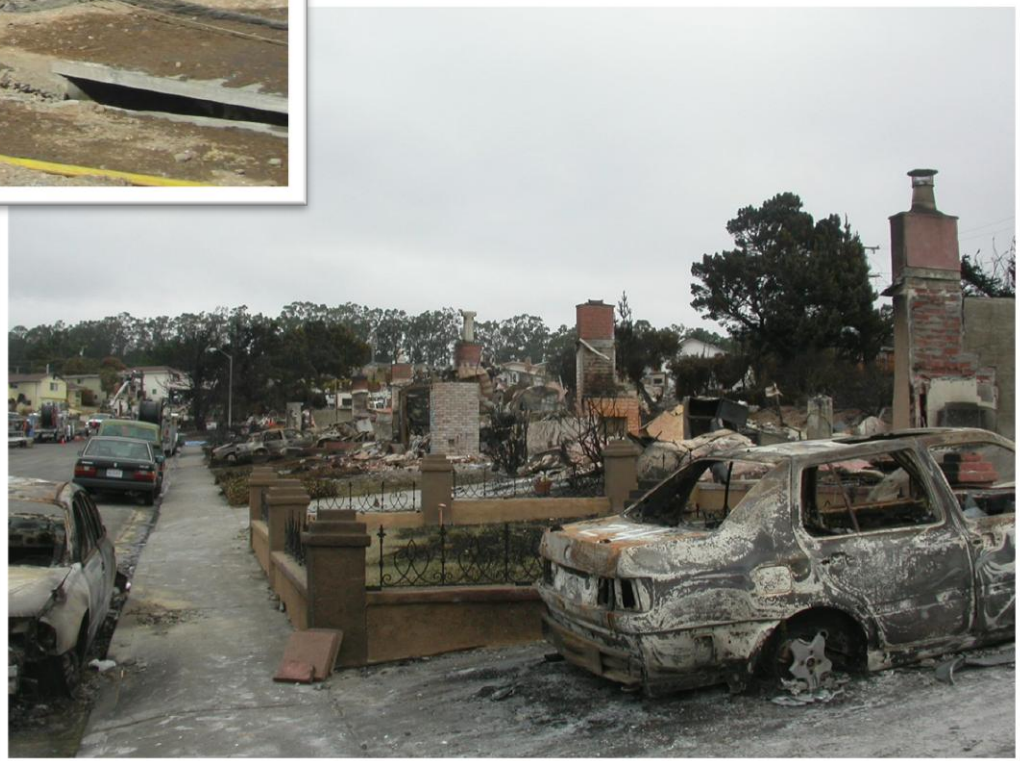
Beyond Trust but Verify

- Meaningful safety objectives?
- Effective performance?

Beyond San Bruno and Marshall . . .

Infrastructure Integrity: Design, Build, and Maintain

- 600,000 bridges
- Public roads: ~ 4 million miles
- Major railroads: 120,000 miles
- Oil/gas pipelines: 2.6 million miles
- Commercially navigable waterways: > 25,000 miles



San Bruno, CA

Changing Safety Culture

Reactive → proactive

Safety goal . . .

→ 0

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